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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,422	12/12/2003	Bing Shen	139805	1421

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EXAMINER
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HO, ALLEN C

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EX

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/707,422	SHEN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Objections*

1. Claim 27 is objected to because of the following informalities: line 6, "a sensor device" should be replaced by --the sensing device--. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 10-15, 18-23, and 26-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Pfoh (U. S. Patent No. 5,657,364).

With regard to claims 1 and 2, Pfoh disclosed a focal spot sensing device comprising: a housing (rotating gantry) that resists x-ray beams (all material attenuate x-rays to some degree); an opening (204, 206, 208, 210) disposed in a wall of the housing that allows an x-ray beam to enter the housing; and a sensor device (100, 102) disposed in the housing that interprets a position of the x-ray beam for calculating a position of a focal spot (column 5, lines 15-26), the sensor device being disposed in the housing such that an area of the x-ray allowed to fall on the sensor device changes in response to movement of the focal spot (Fig. 4).

With regard to claim 3, Pfoh disclosed the device of claim 1, wherein the opening is sized such that the x-ray beam at a surface of the sensor device is less than a total sensitive area of the sensor device (Figs. 4-6).

With regard to claim 4, Pfoh disclosed the device of claim 1, wherein the sensor device includes at least two detector elements (**100, 102**) arranged next to each other.

With regard to claim 10 and 11, Pfoh disclosed the device of claim 1, further comprising a control mechanism (**36**) that calculates the focal spot movement and compensates for detector response error induced by focal spot movement (column 4, lines 52-64).

With regard to claims 12 and 13, Pfoh disclosed a focal spot sensing device comprising: a housing (rotating gantry) that resists x-ray beams (all material attenuate x-rays to some degree); an opening (**204, 206, 208, 210**) that allows an x-ray beam to enter the housing; and means for calculating (**100, 102**) a position of a focal spot (column 5, lines 15-26), wherein an area of the x-ray is allowed to fall on the means for calculating such that the area changes in response to movement of the focal spot (Fig. 4).

With regard to claim 14, Pfoh disclosed the device of claim 12, wherein the opening is sized such that the x-ray beam at a surface of the means for calculating is less than a total sensitive area of the sensor device (Figs. 4-6).

With regard to claim 15, Pfoh disclosed the device of claim 12, wherein the means for calculating includes at least two detector elements (**100, 102**) arranged next to each other.

With regard to claim 18 and 19, Pfoh disclosed the device of claim 12, further comprising a control mechanism (**36**) that calculates the focal spot movement and compensates for detector response error induced by focal spot movement (column 4, lines 52-64).

With regard to claims 20 and 21, Pfoh disclosed an imaging system comprising: an x-ray source (14) that produces an x-ray beam (16) and has a focal spot (50); a detector array (18) that receives the x-ray beam and includes a focal spot sensing device, the focal spot sensing device includes: a housing (rotating gantry) that resists x-ray beams, an opening (204, 206, 208, 210) disposed in a wall of the housing that allows the x-ray beam to enter the housing; and a sensor device (100, 102) disposed in the housing that interprets a position of the x-ray beam for calculating a position of the focal spot (column 5, lines 15-26), the sensor device being disposed in the housing such that an area of the x-ray allowed to fall on the sensor device changes in response to movement of the focal spot (Fig. 4).

With regard to claim 22, Pfoh disclosed the device of claim 20, wherein the opening is sized such that the x-ray beam at a surface of the sensor device is less than a total sensitive area of the sensor device (Figs. 4-6).

With regard to claim 23, Pfoh disclosed the device of claim 20, wherein the sensor device includes at least two detector elements (100, 102) arranged next to each other.

With regard to claim 26, Pfoh disclosed the system of claim 20, further comprising a control mechanism (36).

With regard to claim 27, Pfoh disclosed a method for sending a focal spot, the method comprising: receiving an x-ray beam into an opening (204, 206, 208, 210) of a focal spot sensing device (100, 102); interpreting a position of the x-ray beam; and calculating a position of the focal spot (column 5, lines 15-26) in response to an area of the x-ray beam allowed to fall on the sensing device changes in response to movement of the focal spot (Fig. 4).

With regard to claim 28, Pfoh disclosed the method of claim 27, further comprising calibrating a CT system detector response to the position of a focal spot (column 4, lines 52-64).

With regard to claim 29, Pfoh disclosed the method of claim 27, further comprising receiving the x-ray beam at a sensor device disposed in the focal spot sensing device, the sensor device (100, 102) includes at least two detector elements arranged next to each other.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5-9, 16, 17, 24, 25, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfoh (U. S. Patent No. 5,657,364) as applied to claims 1, 4, 12, 20, and 27 above, and further in view of Warren (U. S. Patent No. 6,362,481 B1).

With regard to claims 5, 6, 8, 9, 16, 17, 24, 25, and 30, Pfoh disclosed the device of claims 1, 12, 20, and the method of claim 27. However, Pfoh failed to disclose a sensor device that includes a fluorescent screen, which faces the opening, and a position sensitive photodiode that is arranged between the fluorescent screen and a back wall of the housing, wherein the fluorescent screen is optically coupled to the position sensitive photodiode by a transparent epoxy layer.

Warren disclosed a CT sensor device that includes a fluorescent screen (36) and a position sensitive photodiode (40), wherein the scintillator/fluorescent screen is optically coupled

to the position sensitive photodiode by a transparent epoxy layer (46). Warren taught that such an arrangement provides an efficient x-ray detector because the presence of a transparent epoxy layer between the fluorescent screen and the photodiode minimizes optical losses (column 1, lines 28-63). Furthermore, this CT sensor device will remain operational at high temperature because the epoxy layer's CTE is matched to the scintillator/fluorescent screen and the photodiode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the CT sensor device disclosed by Warren in the CT imaging system disclosed by Pfoh, since a person would be motivated to capture all of the x-rays transmitted through the patient by employing an efficient x-ray detector. Furthermore, a person would be motivated save operating cost by using an x-ray detector that is not susceptible to damage due to thermal stress.

With regard to claim 7, Pfoh in combination with Warren disclosed the device of claim 6, wherein the opening is dimensioned to be approximately a pinhole (204, 206, 208, 210).

### ***Response to Arguments***

6. Applicant's arguments filed 29 July 2005 have been fully considered but they are not persuasive.

The applicant argues that Pfoh failed to teach an area of the x-ray allowed to fall on the sensor device changes in response to movement of the focal spot. This argument is not persuasive. Pfoh disclosed a sensor device that comprises a plurality of detector elements (100, 102), each detector element generates a signal in response to an intensity of a portion of the x-ray

beam (16) falling on it. Phof disclosed two slots (112, 114) extending through attenuators (108, 110) respectively, so that only a portion of each detector element is open to the x-ray beam. The slots are positioned so that each slot is aligned with an extreme position (116, 118) of the focal spots (50). As is clearly shown in Fig. 4, a different area of the x-ray beam falls on sensor device when the focal spot moves from one extreme position to another. When the focal spot is at the left extreme position (116), the central x-ray beam falls directly on the detector element (100), while the detector element (102) is illuminated by an area of the x-ray beam on the right of the central x-ray beam. When the focal spot is at the right extreme position (118), the central x-ray beam falls directly on the detector element (102), while the detector element (100) is illuminated by an area of the x-ray beam on the left of the central x-ray beam. Thus, a different area of the x-ray beam falls on the sensor device in response to movement of the focal spot.

The rejections are being maintained.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Popescu (U. S. Patent No. 6,652,143 B2) disclosed a sensor device that detects the movement of a focal spot.
- (2) Sasaki *et al.* (U. S. Patent No. 6,411,672 B1) disclosed a detector housing.
- (3) Saito *et al.* (U. S. Patent No. 5,566,220) disclosed a sensor device that detects the movement of a focal spot.



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- (4) Boomgaarden *et al.* (U. S. Patent No. 4,991,189) disclosed a sensor device that detects the movement of a focal spot.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen C. Ho  
Primary Examiner  
Art Unit 2882

11 October 2005